A Closer Look at Severe Maternal Morbidity in Colorado:

Trends, Disparities, and Opportunities for Action

Prepared by the Colorado Perinatal Care Quality Collaborative (CPCQC)
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Each year, there are more than 60,000 births in Colorado.[1] Most occur without major complications for women or their babies, yet serious health problems during labor, delivery, or the postpartum period still affect too many families. These complications can have lasting effects and often reflect the conditions and systems that shape access to timely, quality care.

To track these outcomes consistently, health experts use a measure called *severe maternal morbidity* (SMM), a standardized group of hospital-based complications that signal life-threatening events during childbirth. These can include severe bleeding, kidney or heart failure, and hysterectomy, among others. Experiencing SMM can have lasting physical and emotional consequences, and individuals who experience it are more likely to be readmitted to the hospital postpartum or to face mental health or substance use challenges within the first year postpartum.[2,3]

The CDC definition of severe maternal morbidity (SMM) includes unexpected outcomes of labor and delivery that can result in significant short- or long-term health consequences.

While SMM does not capture every complication or form of suffering that affects mothers and families, such as behavioral health conditions, it provides a validated and comparable way to monitor the most severe, hospital-based complications of birth. Tracking SMM helps Colorado identify patterns in maternal health, assess quality of care, and design targeted interventions to improve perinatal outcomes statewide. Every person giving birth in Colorado deserves a safe, respectful experience that begins their parenting journey feeling supported and healthy.

About the Data

The findings in this brief are based on claims data provided by the Colorado Hospital Association. They reflect the five-year time period from 2020 to 2024 and include births that occurred in Colorado hospitals. This analysis identified delivery hospitalizations with severe maternal morbidity (SMM) using the Centers for Disease Control and Prevention (CDC) standardized methodology, which relies on administrative hospital discharge data and ICD codes across 21 established indicators (16 diagnoses and five procedures) associated with in-hospital mortality. It is important to note that while behavioral health conditions are the leading cause of pregnancy-associated deaths in Colorado, severe maternal morbidity (SMM) indicators do not capture behavioral health conditions. For more details, refer to the Appendix.

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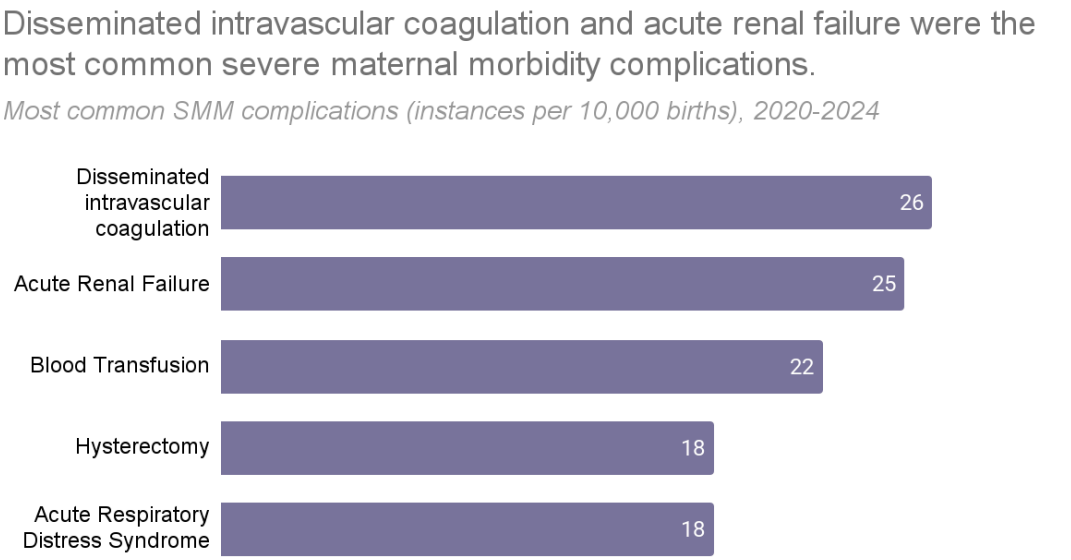
[1] Colorado Department of Public Health and Environment, Vital Statistics Program.
[2] Harvey, E.M., Ahmed, S., Manning, S.E., Diop, H., Argani, C., Strobino, D.M. (2018). Severe maternal morbidity at delivery and risk of hospital encounters within 6 weeks and 1 year postpartum. *Journal of Women's Health 27*(2), pp. 140-147.
[3] Wolfson, C.L., Angelson, J.T., & Creanga, A.A. (2025). Is severe maternal morbidity a risk factor for postpartum hospitalization with mental health or substance use disorder diagnoses? Findings from a retrospective cohort study in Maryland: 2016–2019. *Maternal Health, Neonatology and Perinatology 11*.

How common is severe maternal morbidity?

Severe maternal morbidity is several times more common than maternal mortality; nationally, there are approximately 650 to 750 maternal deaths each year, while between 50,000 and 60,000 people experience severe maternal morbidity.[4] In Colorado, there were **169 instances of severe maternal morbidity per 10,000 births** between 2020 and 2024, which translates to an average of **1,000 instances of severe maternal morbidity each year**. Although there is no directly comparable national rate of severe maternal morbidity for 2020 through 2024, a recent analysis found that the SMM rate for the U.S. in 2021 was 180 per 10,000 births.[5]

What are the most common causes of severe maternal morbidity in Colorado?

Disseminated intravascular coagulation (DIC) was the **most common SMM complication** among Colorado births from 2020 to 2024. DIC is a rare but life-threatening condition in which the body's clotting process malfunctions: instead of stopping bleeding, small clots form throughout the bloodstream and can block blood flow to vital organs. This depletes clotting factors and can lead to severe, uncontrolled bleeding. DIC often arises from other obstetric emergencies, such as heavy bleeding, severe infection, or placental complications.



Acute renal failure, or sudden kidney failure, was the **second-most common cause of SMM**. This condition occurs when the kidneys can no longer filter waste or balance fluids, causing toxins and fluid to build up rapidly and become life-threatening without treatment. During and

[4] Declercq, E. & Zephyrin, L.C. (2021). Severe maternal morbidity in the United States: A primer. New York: The Commonwealth Fund. Retrieved from https://www.commonwealthfund.org/publications/issue-briefs/2021/oct/severe-maternal-morbidity-united-states-primer.

[5] Fink, D.A., Kilday, D. & Cao, Z. (2023). Trends in maternal mortality and severe maternal morbidity during delivery-related hospitalizations in the United States, 2008 to 2021. *JAMA Network Open 6*(6).

after pregnancy, acute renal failure can develop when there is not enough blood flow to the kidneys, often due to severe bleeding, very high blood pressure, infection, or complications such as preeclampsia or sepsis. Together, DIC and acute renal failure accounted for nearly one-third of all SMM cases, consistent with national trends.

Other common SMM indicators during this period included blood transfusion, hysterectomy, and acute respiratory distress syndrome. Blood transfusion is one of the most frequent SMM indicators nationally and in Colorado. However, following accepted methodology, only transfusions that occurred alongside another qualifying SMM condition were included, as transfusion-only events often do not reflect true life-threatening morbidity.

These leading causes of SMM—whether related to severe bleeding, infection, hypertensive disorders, organ dysfunction, or respiratory failure—often arise suddenly and progress quickly. Prevention across all five indicators depends on early recognition, rapid intervention, and timely access to the appropriate level of maternity and emergency care. Strengthening readiness for obstetric emergencies and improving coordinated systems of care can reduce the risk of these life-threatening outcomes.

Which Coloradans are most likely to experience severe maternal morbidity?

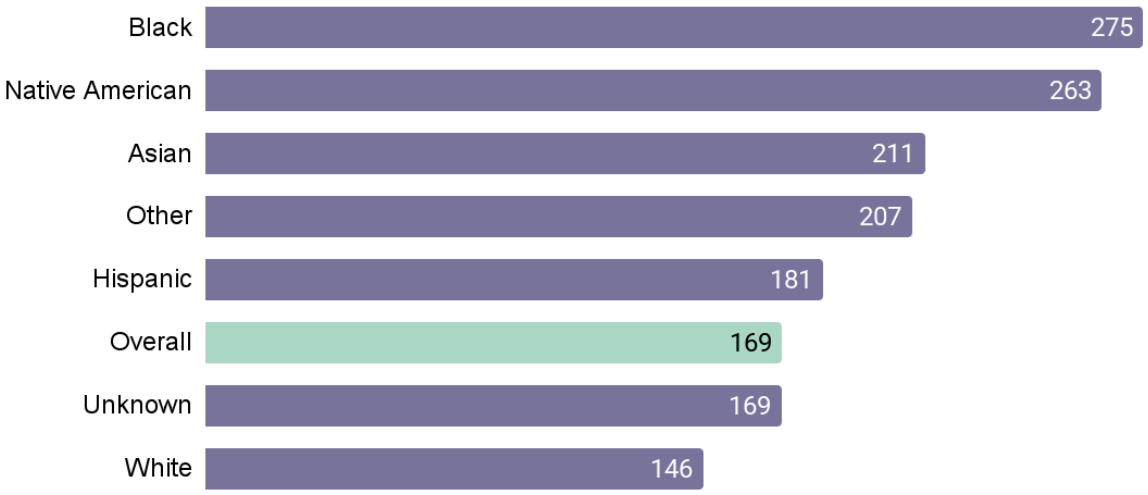
Some Coloradans face greater risk of SMM than others because the conditions and systems surrounding their care are not the same. Differences in SMM rates often reflect unequal access to timely, high-quality care and longstanding differences in community resources, as well as the higher burden of chronic health conditions linked to social and economic factors. In Colorado, mothers who are Black, Native American, older than 35, or covered by Medicaid experience higher rates of SMM than other groups, underscoring the need to address the structural conditions that shape maternal health.

Severe maternal morbidity by race

Colorado, like the rest of the nation, continues to see significant racial and ethnic inequities in perinatal health outcomes, and this pattern holds true for SMM. In Colorado, **Black and Native American mothers experience SMM at nearly twice the rate of the overall birthing population.** These inequities do not occur by chance. They reflect the accumulated impact of policies, practices, and conditions that have limited access to consistent, high-quality care and created unequal exposure to stressors that affect health over time. National research shows that systemic factors—including structural racism, unequal resource investment, and barriers to respectful, responsive care—contribute to these patterns and shape maternal health long before pregnancy begins

Black birthing people and Native American birthing people were nearly twice as likely as white birthing people to experience severe maternal morbidity.

Instances of severe maternal morbidity per 10,000 births by race/ethnicity, 2020-2024

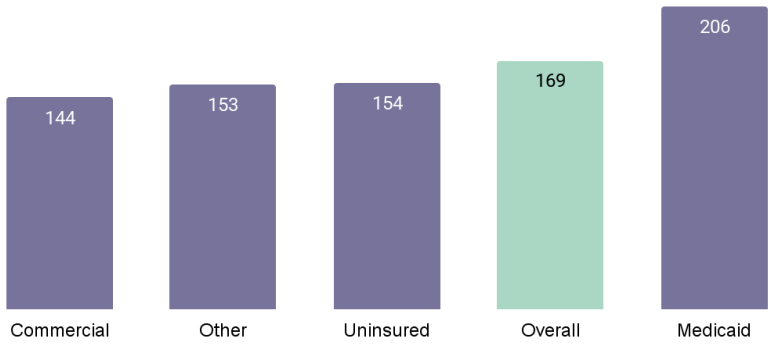


Severe maternal morbidity by payor

Primary payor–or a patient's main source of health coverage–can signal differences in access to care and the broader conditions that shape health. In Colorado, SMM rates are **higher among women covered by Medicaid,** which often reflects barriers to stable coverage, consistent care, and other structural inequities. Coloradans with commercial insurance had the lowest rates of severe maternal morbidity.

Severe maternal morbidity was more common among patients covered by Medicaid.

*Instances of severe maternal morbidity per 10,000 births by primary payor, 2020-2024**



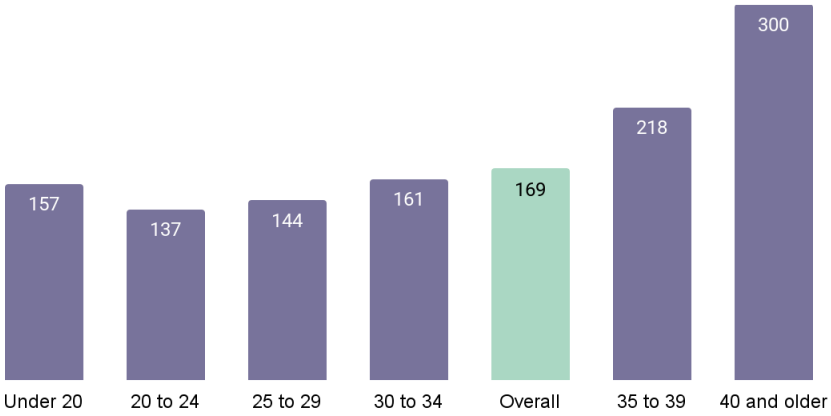
**Birthing people whose primary payor was Medicare had an SMM rate that was more than triple the overall rate (515 instances per 10,000 births). These data should be interpreted with caution, however, as they are based on fewer than 30 instances of SMM. Individuals in this group likely have complex medical needs, facing serious comorbidities or disabling conditions that increase the risk of severe maternal morbidity.*

Severe maternal morbidity by age

Women ages 40 and older are more than twice as likely as those ages 20 to 24 to experience severe maternal morbidity – mirroring patterns observed in maternal mortality rates.[6] Age-related variation in SMM may reflect differences in obstetric management patterns across age groups, underlying health status, and obstetric risk factors. Older women are more likely to have preexisting conditions such as hypertension, cardiovascular disease, or prior obstetric complications, and they have higher cesarean delivery rates, which can increase surgical risks such as hysterectomy. Variation across age groups may also reflect clinical decision-making, including greater use of uterine-sparing approaches with younger patients.

Severe maternal morbidity generally becomes more common with age.

*Instances of severe maternal morbidity per 10,000 births by age group, 2020-2024**



Severe maternal morbidity by delivery type

Cesarean births are often medically necessary and, when indicated, can be life-saving for both mother and baby. However, like any surgery, cesarean delivery carries inherent risks—including infection, hemorrhage requiring transfusion, thromboembolic events, and anesthetic complications. Cesareans are also more likely to be performed in the presence of conditions that already increase the risk of SMM, such as hypertensive disorders, abnormal placentation, or fetal distress. Because of this interplay between underlying complications and surgical risk, differences in SMM rates by delivery type should be interpreted with caution: many of the same conditions that lead to a cesarean are also those that increase the likelihood of SMM, meaning the cesarean is often a response to the complication rather than its cause.

In Colorado, people who gave birth via cesarean were significantly more likely to experience SMM than those who delivered vaginally. The SMM rate for cesarean deliveries was nearly five times higher than for vaginal deliveries (380 per 10,000 versus 80 per 10,000 births), reflecting both the surgical risks of cesarean delivery and the more complex clinical scenarios of patients who require it.

[6] Colorado Department of Public Health and Environment. (2023). *Maternal Mortality in Colorado, 2016-2020.*

Cesarean rates also vary widely by hospital, with low-risk, first-time cesarean rates ranging from approximately 10.5% to 40.2% across Colorado hospitals during this period. While some variation reflects differences in patient mix and clinical capacity, such a broad range suggests opportunities to safely reduce unnecessary surgical births—thereby lowering exposure to surgical risk and potentially reducing SMM.

How does severe maternal morbidity vary across the state?

Severe maternal morbidity varies regionally in Colorado, shaped by limited maternity care in rural communities and higher-risk patient care in urban hospitals. Examining SMM by *patient residence* highlights factors such as access to care, while examining it by *hospital region* reflects patient acuity and referral patterns. Both perspectives are essential for understanding and addressing SMM across the state.

Rural regions of the state have some of the highest SMM rates when examined by *patient residence*. For this analysis, regions are defined using Colorado's Health Statistics Regions (HSRs), standardized county groupings created by the Colorado Department of Public Health and Environment (CDPHE) for consistent reporting. The southeastern region (HSR 6) had the state's highest SMM rate at 290 per 10,000 births—nearly double the statewide rate. Rates were also elevated in rural areas of central and northeastern Colorado and in the San Luis Valley. These patterns likely reflect factors that disproportionately affect rural communities, including longer travel times to care, fewer local maternity services, higher burdens of chronic conditions, and longstanding social and economic inequities that make timely, high-quality care harder to access.

Colorado-specific data show that distance to obstetric care is a significant challenge for rural residents. In 2024 claims data, rural patients with SMM traveled a median of 38 miles—essentially the same distance at which a large Pennsylvania study found elevated risk (60 km, or about 37 miles). That study reported sharply higher risks beginning at this threshold, increasing further at longer distances (e.g., a 53% higher risk at 80 km, or about 50 miles).[7] These findings align with concerns in Colorado, where many rural residents travel long distances—often across mountainous terrain—for delivery care.

The prevalence of SMM in rural areas is especially concerning given the reduced availability of maternity services. Twenty-four rural Colorado counties—nearly 40%—are maternity care deserts, lacking hospitals or birth centers offering obstetric care and local obstetric providers.[8] Access has been further constrained by recent closures of hospital labor and delivery units and birthing centers. Evidence from other states underscores the impact of these service gaps: in Iowa, counties that lost their sole birthing facility saw significantly higher rates of inadequate and

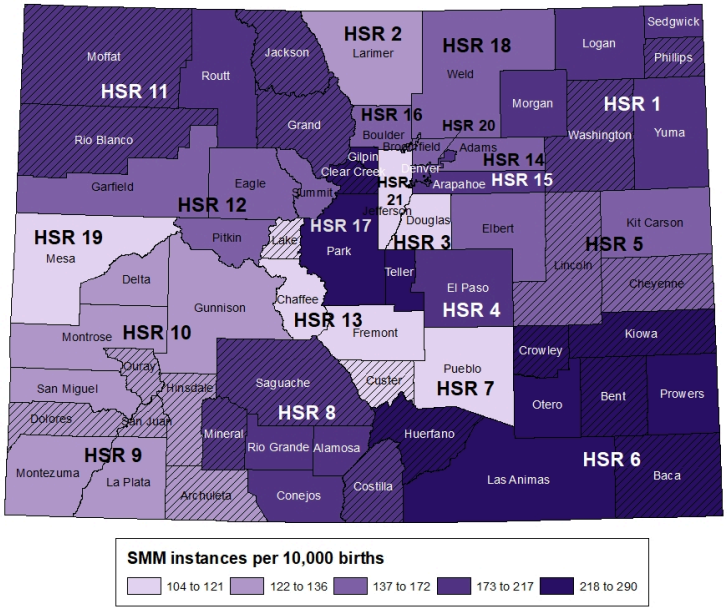
[7] Minion, S., Krans, E., Brooks, M., Mendez, D., Haggerty, C. *Association of Driving Distance to Maternity Hospitals and Maternal and Perinatal Outcomes*. Obstet Gynecol. 2022 Nov 1;140(5):812-819. doi: 10.1097/AOG.0000000000004960. Epub 2022 Oct 5. PMID: 36201778.

[8] Fontenot, J, Lucas, R, Stoneburner, A, Brigance, C, Hubbard, K, Jones, E, Mishkin, K. Where You Live Matters: Maternity Care Deserts and the Crisis of Access and Equity in Colorado. March of Dimes. 2023.

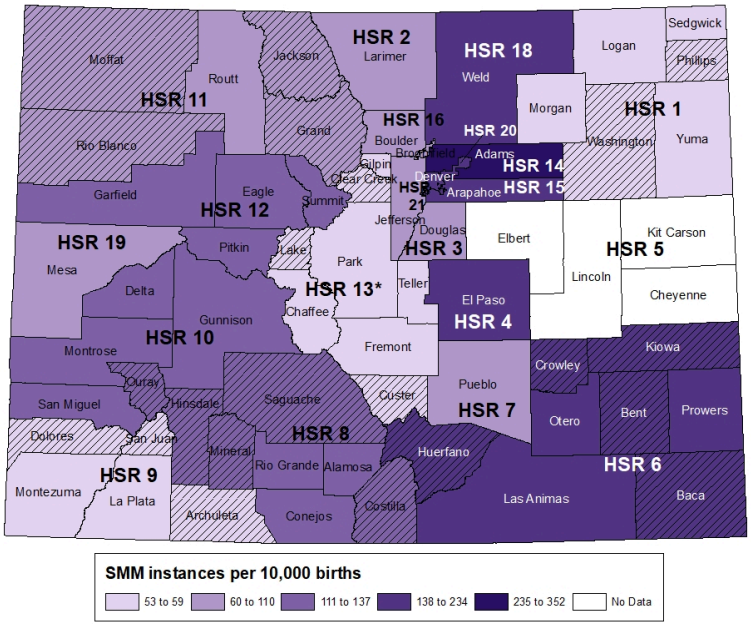
delayed prenatal care than counties where facilities remained open.[9] These patterns mirror the risks facing Colorado's rural communities, where the loss of obstetric services may increase delays, reduce continuity of care, and heighten vulnerability to complications during pregnancy and delivery.

A different pattern emerges when SMM rates are examined by the health statistics region of hospitals rather than patient residences. **Among the five regions with the highest SMM rates based on hospital region, four were urban counties along the Front Range.** This pattern likely reflects the fact that urban hospitals have the volume, staffing, and specialized equipment needed to manage higher-acuity patients and more complex obstetric emergencies. These hospitals therefore serve as referral centers for patients transferred from across the state—including those with complications or high-risk pregnancies.

Severe Maternal Morbidity Rates by Patient's Health Statistics Region, 2020-2024



Severe Maternal Morbidity Rates by Hospital's Health Statistics Region, 2020-2024



Counties shaded with a crosshatch pattern are considered maternity care deserts by the March of Dimes. Maternity care deserts are counties where there are no hospitals or birth centers offering obstetric care and no obstetric providers.

**As outlined by the Colorado Department of Public Health and Environment, HSR 13 includes Lake, Chaffee, Fremont and Custer counties. However, the Colorado Hospital Association combined HSR 13 with HSR 17 (Gilpin, Clear Creek, Park and Teller counties) for the purposes of the hospital HSR analysis to prevent disclosure of hospital-identifiable data, as HSR 13 contains only one hospital.*

[9] Rouse, H.L., Abraham, W.T., Wallace, L., Bruning, J., Dorius, C. (2022) *Access to care, outcomes, and birthing unit closures: Results from a statewide mixed methods study in Iowa.* Prepared for the Iowa Department of Public Health, Des Moines, IA.

What Colorado Can Do: Recommendations for Reducing Severe Maternal Morbidity

Reducing severe maternal morbidity (SMM) requires coordinated action across hospitals, health systems, emergency medical services, communities, and state agencies. Colorado's data highlight opportunities to strengthen prevention, early identification, and equitable response to obstetric complications, and to translate surveillance findings into targeted improvement efforts.

1. Strengthen clinical readiness and response to obstetric emergencies, especially in rural communities.

- Hospitals can partner with Colorado Perinatal Care Quality Collaborative (CPCQC) to implement and sustain maternal patient safety bundles informed by the national Alliance for Innovation on Maternal Health (AIM) standards. These bundles underpin CPCQC's maternal quality improvement initiatives aimed at reducing preventable severe maternal morbidity, including SOAR, which supports hospitals in safely reducing first-time, low-risk cesarean rates. Under Colorado's SB24-175, all birthing hospitals must participate annually in at least one CPCQC initiative beginning December 15, 2025. Outpatient sites can complement this work by implementing preventive bundles that identify high-risk patients early and support timely postpartum follow-up.
- Adopt or adapt a maternal and neonatal levels of care framework, such as CDC's LOCATe or the ACOG's Levels of Maternal Care. These tools support consistent assessment of facility capabilities, alignment of maternal and neonatal care levels, and development of effective referral and transfer networks. Integrating this approach helps ensure patients receive the right care, in the right place, at the right time.
- Ensure rural and low-volume hospitals—including emergency departments and facilities without obstetric units—remain open and have access to simulation training, obstetric telehealth consultation, perinatal readiness resources, and standardized transfer protocols for high-risk patients.

2. Improve access to comprehensive prenatal and postpartum care.

- Expand access to continuous, integrated care before, during, and after pregnancy, particularly for people with chronic conditions or limited access in rural areas. Utilize remote patient monitoring, telehealth, and targeted financial incentives to strengthen the rural obstetric workforce and reduce distance to obstetric care in rural communities. Remote teleconsultation services within specialities like maternal-fetal medicine, or Colorado's PROSPER program for provider-to-provider perinatal psychiatry support and referrals, also expand access to high-quality care statewide.
- Support early and consistent postpartum follow-up by scheduling visits before discharge; offering telehealth or remote monitoring when appropriate; providing universal home visiting; and addressing barriers such as transportation and childcare. CPCQC's Supporting Postpartum Access, Recovery, and Knowledge (SPARK) program strengthens postpartum care by standardizing discharge education, improving

recognition of early warning signs, and connecting families to timely follow-up and ongoing support. Birthing hospitals can enroll in SPARK beginning in 2026.

3. Address disparities in maternal health outcomes.

- Disparities in maternal health outcomes are preventable. National organizations—including the Maternal Mental Health Leadership Alliance, the Association of Maternal and Child Health Programs, and the Policy Center for Maternal Mental Health—regularly share evidence-based and promising practices to advance equity. Community-based organizations and people with lived experience are also essential partners in addressing local disparities. Strategies include provider training, integrating patient advocates into quality improvement efforts, and expanding culturally responsive care models. CPCQC, for example, conducts provider training on respectful care and leverages its Family Integration to Restore Trust (FIRST) program to incorporate lived experience experts into quality improvement programming.
- At the hospital level, review SMM data disaggregated by race, ethnicity, and payor to identify disparities and guide targeted interventions. Consider complementary measures such as ePC-07 (severe obstetric complications), a Joint Commission metric that provides a risk-adjusted alternative to the CDC SMM definition for hospital-level tracking.

4. Strengthen data linkages and surveillance.

- Use SMM data disaggregated by race, ethnicity, geography, payor, and social vulnerability to inform targeted interventions and resource allocation. Colorado's Maternal Health Dashboard, launched in September 2025, provides public access to state-level SMM data and related maternal health indicators through a collaboration among Colorado Hospital Association (CHA), Colorado Department of Public Health and Environment (CDPHE), CPCQC, and hospital partners.
- Pair SMM data with maternal mortality review findings to identify preventable factors and inform statewide prevention strategies. Future Maternal Health Dashboard iterations may link maternal mortality data with hospital discharge records to explore connections between severe maternal morbidity and maternal deaths. These updates will also integrate findings from the Maternal Mortality Review Committee (MMRC) to identify preventable factors and systemic contributors to maternal harm, strengthening Colorado's capacity for continuous, data-driven maternal health surveillance.
- Continue strengthening data linkages between vital records, hospital claims, and outpatient claims from Colorado's All-Payer Claims Database (APCD) to better understand risk factors and outcomes beyond delivery, including out-of-hospital births and births to uninsured individuals. CHA data captures only delivery hospitalizations, while APCD outpatient claims provide insights into prenatal and postpartum care but exclude uninsured populations and births not billed to insurance. Partnerships established in 2025 among CHA, CPCQC, and CDPHE will be expanded to enhance data integration and analytic capacity, while continued collaboration across data holders can improve the completeness and utility of perinatal outcome data statewide.

5. Support maternal mental health and substance use care.

- Because SMM indicators do not capture mental health or substance use-related complications (see *Limitations* section), align SMM surveillance with complementary datasets to monitor these leading causes of maternal mortality. Ongoing collaborations among CPCQC, CHA, CDPHE, and the CIVHC are advancing this work through linked surveillance, claims, and survey data. Forthcoming iterations of the Maternal Health Dashboard may include mental health and substance use disorder codes to understand the broader behavioral health burdens in the community.
- Invest in perinatal mental health screening, referral pathways, and integration of behavioral health in obstetric settings to prevent escalation of mental health or substance use-related complications. In hospital settings, CPCQC's Turning the Tide program promotes universal screening and stigma-free care for families impacted by substance use; both Turning the Tide and SPARK promote universal screening and comprehensive follow-up care for perinatal mental health conditions. In the community setting, CPCQC's Improve Perinatal Access, Coordination, and Treatment for Behavioral Health (IMPACT BH) program strengthens and integrates local perinatal behavioral health systems across Colorado.

Conclusion

Colorado now has a clearer and more comprehensive understanding of the conditions that shape the most serious complications of childbirth. The patterns in this report show how access to timely, high-quality care, the design of clinical and referral systems, and longstanding structural inequities influence maternal health across communities. They also highlight concrete opportunities to prevent harm before it occurs.

By strengthening clinical readiness and emergency response, expanding access to prenatal and postpartum care, improving coordination across systems, and addressing the structural drivers of racial, geographic, and insurance-related disparities, Colorado can reduce severe maternal morbidity and improve outcomes statewide. Continued investment in robust data systems and sustained partnerships among hospitals, public health agencies, EMS, and community organizations will be essential to lasting progress.

With coordinated action, Colorado can build a maternity care system where every woman has the resources, support, and high-quality care they need to thrive.

Appendix: Limitations, Methodology and Data Notes

Limitations of Severe Maternal Morbidity as a Perinatal Health Measure

It is important to note that severe maternal morbidity (SMM) indicators do not capture mental health or substance use-related conditions. The SMM framework was originally developed to identify obstetric complications associated with in-hospital mortality during delivery hospitalizations, based on inpatient diagnosis and procedure codes. Because the majority of mental health and substance use-related diagnoses, treatments and complications occur outside the birth admission, SMM is not a suitable measure for identifying these events.

This limitation is particularly relevant in Colorado, where suicide and accidental overdose are the leading causes of maternal mortality and usually occur in the postpartum period outside of the hospital.[10] Complementary measures are therefore needed to fully understand the scope of perinatal mental health and substance use–related morbidity and mortality.

In addition, SMM reflects complications that occur during the delivery hospitalization only and does not capture severe complications that arise after discharge, such as those occurring days or weeks postpartum. Because SMM is calculated from inpatient discharge data, postpartum complications treated in emergency departments or outpatient settings are not included in this measure.

However, SMM remains a valuable tool for examining hospital-based outcomes and conducting state-level surveillance of serious obstetric complications, helping Colorado track trends, identify disparities, and guide targeted quality improvement efforts.

Methodology

The findings in this brief are based on claims data provided by the Colorado Hospital Association. These data reflect the five years between 2020 and 2024 and include births that occurred in Colorado hospitals. Because these data come from administrative hospital claims, they represent the diagnoses and procedures billed during the *delivery hospitalization*.

This analysis identified delivery hospitalizations with severe maternal morbidity (SMM) using the Centers for Disease Control and Prevention (CDC) standardized methodology, which relies on administrative hospital discharge data and ICD codes across 21 established indicators (16 diagnoses and five procedures) associated with in-hospital mortality. *Click here to see the full list of ICD codes used to identify instances of severe maternal morbidity using the CDC definition.* In line with established conventions for SMM analysis, cases where blood transfusion was the only SMM indicator were excluded from the analyses in this brief.

[10] Colorado Department of Public Health and Environment. (2023). *Maternal Mortality in Colorado, 2016-2020.*

Data Notes

Although the timeframe examined in this brief includes the COVID-19 pandemic, overall patterns in the data from 2020-2024 are largely similar to those observed in single-year data from 2024.

Severe maternal morbidity data included in the Maternal Health Dashboard may differ slightly from data included in this brief due to small differences in which types of claims and births were included. For more information how the methodology for these two data products differ, please contact data@cpcqc.org.